ONTARIO MINISTRY OF ENVIRONMENT
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ONT. WATER
RESOURCES COMMISSION

ANNUAL REPORT 1965

PORT DOVER

water pollution control plant

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DIVISION OF PLANT OPERATIONS

Ontario Water Resources Commission

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Port Dover : water pollution
control plant.
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ONTARIO WATER RESOURCES COMMISSION
OFFICE OF THE GENERAL MANAGER

Members of the Port Dover Local Advisory Committee,
Port Dover, Ontario.

Gentlemen:

I am pleased to provide you with the 1965 Annual Report for the Port Dover Water Pollution Control Plant, OWRC Project No. 62-S-115.

We appreciate the co-operation you have extended to our Operations staff throughout the year, and trust that continuation of this close association will ensure even greater progress in the sphere of water pollution control.

Yours very truly,

D. S. Caverly,
General Manager.

ONTARIO WATER RESOURCES COMMISSION
801 BAY STREET
TORONTO 5

J. A. VANCE, LL.D.
CHAIRMAN
J. H. H. ROOT, M.P.P.
VICE-CHAIRMAN

D. S. CAVERLY
GENERAL MANAGER
W. S. MacDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir,

I am pleased to provide you with the 1965 Annual Report on the operation of the Port Dover Water Pollution Control Plant, OWRC Project No. 62-S-115.

The report presents design data, outlines operating problems encountered during the year and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

B C Palmer

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

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FOREWORD

This report provides useful information on the operating efficiency of this project during 1965. It is intended to act as a guide in gauging plant performance. To implement that aim, it includes detailed statistical and cost data, a description of the project and a summary of its operation during the year.

Of particular interest will be the cost data, which show the total cost to the municipality and the areas of major expenditure.

The Regional Operations Engineer is primarily responsible for the preparation of the report, and has compiled and arranged the material. He will be pleased to answer any questions regarding it. Other groups, however, were involved in the production, and these include the statistics section, the Drafting Section of the Division of Sanitary Engineering and the Division of Finance.

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

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PORT DOVER

water pollution control plant

operated for

THE TOWN OF PORT DOVER

by the

ONTARIO WATER RESOURCES COMMISSION

CHAIRMAN: Dr. James A. Vance

VICE-CHAIRMAN: J. H. H. Root, M.P.P.

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F. A. Voege	A. K. Watt

COMMISSION SECRETARY

W. S. MacDonnell

DIVISION OF PLANT OPERATIONS

DIRECTOR: B. C. Palmer

Assistant Director:	C. W. Perry
Regional Supervisor:	A. C. Beattie
Operations Engineer:	P. J. Osmond

801 Bay Street Toronto 5

'65 REVIEW

The following report has been written with the intention of providing information on flows, treatment efficiency and costs for the Port Dover Water Pollution Control Plant in 1965.

During 1965 a total of 126.92 million gallons was given primary treatment and between the months of May and November inclusive, the final effluent was chlorinated for the purpose of disinfection.

The raw sewage received at the plant is relatively strong and contains considerable waste from the fish processing industry. The treatment efficiency relative to the raw sewage strengths is considered adequate. However, due to the strong sewage, the effluent discharged from the plant is stronger than normally anticipated from a primary treatment plant accepting normal domestic sewage.

The operating costs for the year were $23,343.94 or $183.93 per million gallons.

The plant staff were effective in keeping a clean, attractive and well maintained project during the past year and no major problems are anticipated in 1966.

GLOSSARY

BOD	biochemical oxygen demand (a measure of organic content)
cfm	cubic feet per minute
comminution	shredding of solids into small fragments
DWF	dry weather flow
effluent	outflow
flocculation	bringing very small particles together to form a larger mass (the floc) before settling
fps	feet per second
gpcd	gallons per capita per day
gpm	gallons per minute
grit	sand, dust, stones, cinders and other heavy inorganic material
influent	inflow
lin. ft.	lineal feet
mgd	million gallons per day
mlss	mixed liquor suspended solids
ppm	parts per million
ss	suspended solids
TDH	total dynamic head (usually refers to pressure on a pump when it is in operation)

HISTORY

1956 - 1965

In 1956, the Town of Port Dover and the Ontario Water Resources Commission began discussions on the proposed water pollution control plant. In 1959, M. M. Dillon and Company were instructed to proceed with the preparation of plans and specifications for the project.

APPROVAL

On June 22, 1962, the municipality signed an agreement with the Commission to finance, construct and operate the project.

CONSTRUCTION

On August 26, 1963, Gilvesy Construction Limited and Valentine Enterprises Limited began construction and by January 10, 1965, they had officially completed the job and the Division of Plant Operations undertook the operation of the Project.

Project Staff

Chief Operator - C. Hayes

Operator - R. Sherburne

COMMENTS

The two members of the plant staff provide eight-hour supervision of the plant and pumping stations on weekdays and partial coverage on weekends. Mr. Hayes commenced his duties as chief operator on June 22, 1964 and Mr. Sherburne on July 20, 1964. Since accepting the position at Port Dover, Mr. Hayes has completed both the basic and intermediate sewage works courses sponsored by the OWRC. Mr. Hayes also attended an OWRC chief operators' conference in the spring of 1965.

Description of Project

INFLUENT WORKS

The plant is located on New Lakeshore Road east of Ontario Street.

Sewage is pumped to the intersection of Pansy Avenue and Erie Street from where it flows to the plant by gravity and enters a wet well from which it is lifted by four raw sewage pumps to the aerated grit tank. A manually cleaned bar screen having 1 inch openings is located in the wet well. Sewage can be by-passed around the plant by diverting it at M. H. #17 to the plant outfall sewer.

Aerated grit removal is provided to remove sand and grit from the raw sewage and the grit tank is cleaned by a mechanical grit collector which places the grit in an elevated hopper.

The plant flow is measured by means of a Parshall flume located immediately downstream of the grit tank.

PRIMARY SEDIMENTATION

Flow from the Parshall flume is diverted to one of three rectangular settling tanks. Approximately 60% of the suspended solids in the raw sewage are removed at this point.

Each tank is equipped with a travelling scraper mechanism which continually scrapes the settled solids to a hopper at one end of the tank and the scum from the surface to a scum pipe at the opposite end of the tank. Both the settled solids (raw sludge) and scum flow by gravity to a sludge concentration tank.

Clarified sewage flows from the sedimentation tanks to the chlorine contact chamber.

CHLORINATION

A baffled chlorine contact chamber retains the clarified sewage for a sufficient period of time to ensure satisfactory disinfection before discharge to the lake. The chlorine is introduced proportionally to the flow at the head of the chamber. Chlorine may also be fed to the wet well and to the sludge concentration tank.

PLANT OUTFALL SEWER

Plant effluent is discharged some two thousand feet from shore into Lake Erie. Approximately 15 feet of water covers the outfall crib structure.

SLUDGE CONCENTRATION TANK

Raw sludge and scum are stored in this tank under aerobic conditions. Thickening of the sludge is possible in this tank by allowing the contents to remain quiescent for a period of time and decanting the relatively clear supernatant.

When sufficient thickened sludge has been accumulated it is pumped to the vacuum filter where still further water is removed.

VACUUM FILTER

In vacuum filtration, lime and ferric chloride are added to sludge from the concentration tank and the resulting mixture is fed to the hopper beneath a circular drum. The drum is covered with a synthetic fabric and a vacuum is applied to its interior. Sludge is sucked onto the drum and as the drum revolves, water is withdrawn from the adhering sludge. The sludge is scraped from the drum after approximately 9/10 of a revolution and deposited on a conveyor which conveys the sludge to a waiting truck.

PUMPING STATIONS

All sewage received at the water pollution control plant is pumped at least once and in some cases twice. There is a total of four pumping stations required to collect sewage from the Town's collection system and transmit it to the plant. Following is a description of each of these stations.

PUMPING STATION #1

This station is located at the intersection of Patrick and Bridge Streets and is a custom built station having a maximum capacity of 2253 IGPM at 70.5' T.D.H. Sewage entering the station is coarse screened, ground and returned to the flow by a barminutor. Pumping is provided by two variable speed and one constant speed pump controlled by a bubbler system. An overflow from this station is available should flows be in excess of maximum capacity. Chlorination facilities have been provided for the addition of chlorine to either the overflow manhole or the raw sewage wet well.

PUMPING STATION #2

This station is located on Lynn Street directly behind Culverhouse Canning. It is a prefabricated station as supplied by Canadian Locomotive and has a capacity of 417 IGPM at 48' T.D.H. Sewage is transmitted by forcemain to the corner of Bridge and Market Streets where it flows by gravity to #1 pumping station. An overflow is provided at the #2 station should there be excessive flows or equipment failure.

PUMPING STATION #3

This station is located near Grand Street some 320 feet north of River Drive. This is also a prefabricated station by Canadian Locomotive and has a capacity of 207 IGPM at 65' T.D.H. The forcemain from this station connects at the corner of River Drive and Grand Street to the 16 inch forcemain from pumping station #1. An overflow is provided to the Lynn River should there be excessive flows or equipment failure.

PUMPING STATION #4

This station is located at the intersection of St. Andrew Street and Harbour Street and consists of a custom built concrete wet well in which two Flygt submersible pumps have been installed. Capacity of this station is 217 IGPM at 19' T.D.H. Sewage is pumped via forcemain to the overflow manhole of pumping station #1 where it flows by gravity to the wet well.

PROJECT COSTS

NET CAPITAL COST (Estimated)	$684,187.41
DEDUCT - Portion Financed by CMHC (Estimated)	463,731.87
Long Term Debt to OWRC	$220,455.54
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1965	$ 7,844.75
Net Operating	$ 23,343.94
Debt Retirement	5,013.00
Reserve	4,928.00
Interest Charged	26,654.23
TOTAL	$ 59,939.17

RESERVE ACCOUNT

Balance at January 1, 1965	$ 2,464.00
Deposited by Municipality	4,928.00
Interest Earned	241.33
	$ 7,633.33
Less Expenditures	-
Balance at December 31, 1965	$ 7,633.33

MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY
JAN	1064.70	771.14			83.67	114.44	19.68	75.77
FEB	1617.18	743.51	672.19	19.79	30.81	115.83	16.57	18.48
MARCH	1792.12	746.56	640.40		59.09	(116.51)	392.06	70.52
APRIL	1747.57	875.24	598.43		35.10		213.50	25.30
MAY	2266.44	1119.84	589.72	164.03	45.31	25.44	214.75	107.35
JUNE	2964.36	746.56	432.92	523.05	42.90	1070.22	6.48	142.23
JULY	1724.25	777.62	414.12		12.19	465.74	12.58	42.00
AUG	1918.03	783.10	432.20	448.05	115.74	7.11	82.96	48.87
SEPT	2411.04	827.39	470.67	662.68	67.91	95.03	204.49	82.87
OCT	1875.05	1192.89	457.55		40.02	(3.72)	152.55	35.76
NOV	1919.29	847.44	500.99	434.42	39.46	14.48	12.44	70.06
DEC	2043.91	826.58	818.91	(120.00)	94.17		310.42	113.83
TOTAL	23343.94	10257.87	6028.10	2132.02	666.37	1788.06	1638.48	833.04

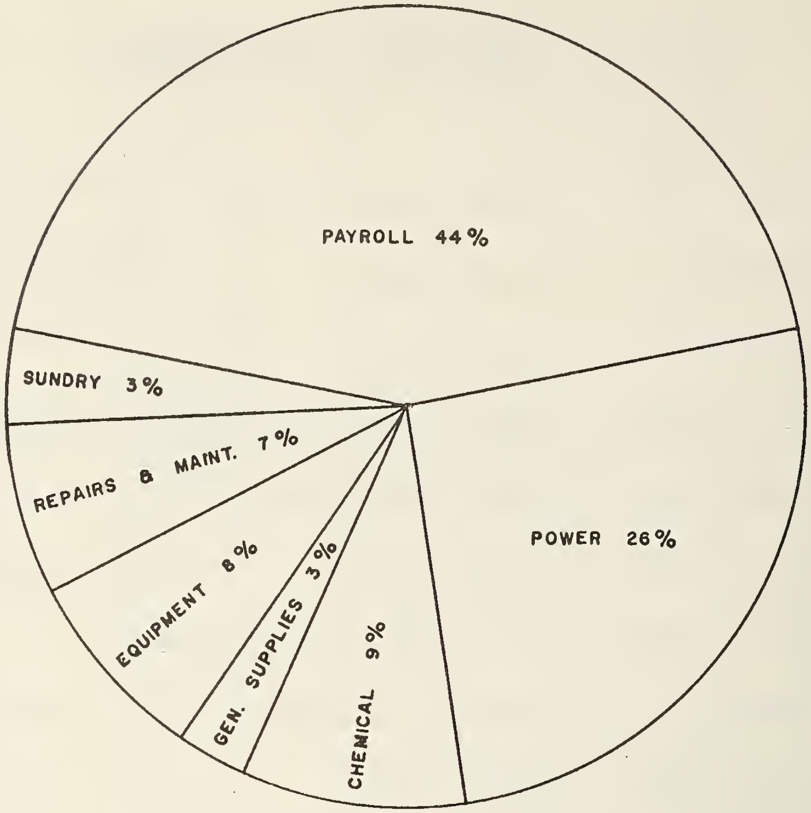
BRACKETS INDICATE CREDIT

YEARLY OPERATING COSTS

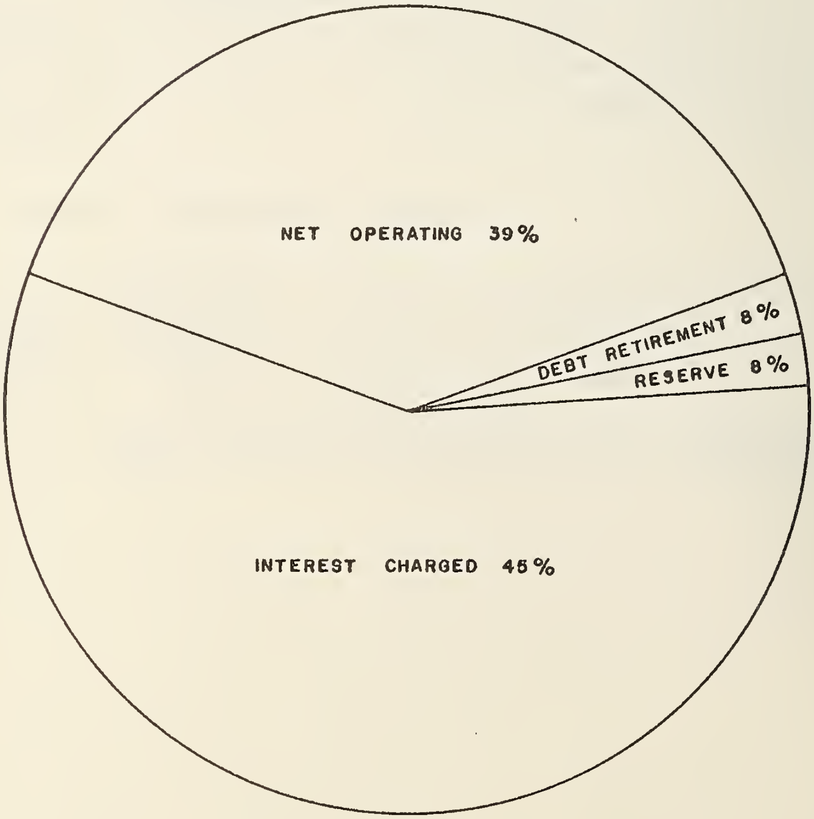
YEAR	M.G. TREATED	TOTAL COST	COST PER FAMILY PER YEAR	COST PER MILLION GALLONS	COST PER L.B. OF BOD REMOVED
1965	126.92	$23,343.94	* $28.47	$183.93	9 CENTS

* BASED ON ANNUAL POPULATION ESTIMATE AND 3.9 PERSONS PER FAMILY

1965 OPERATING COSTS

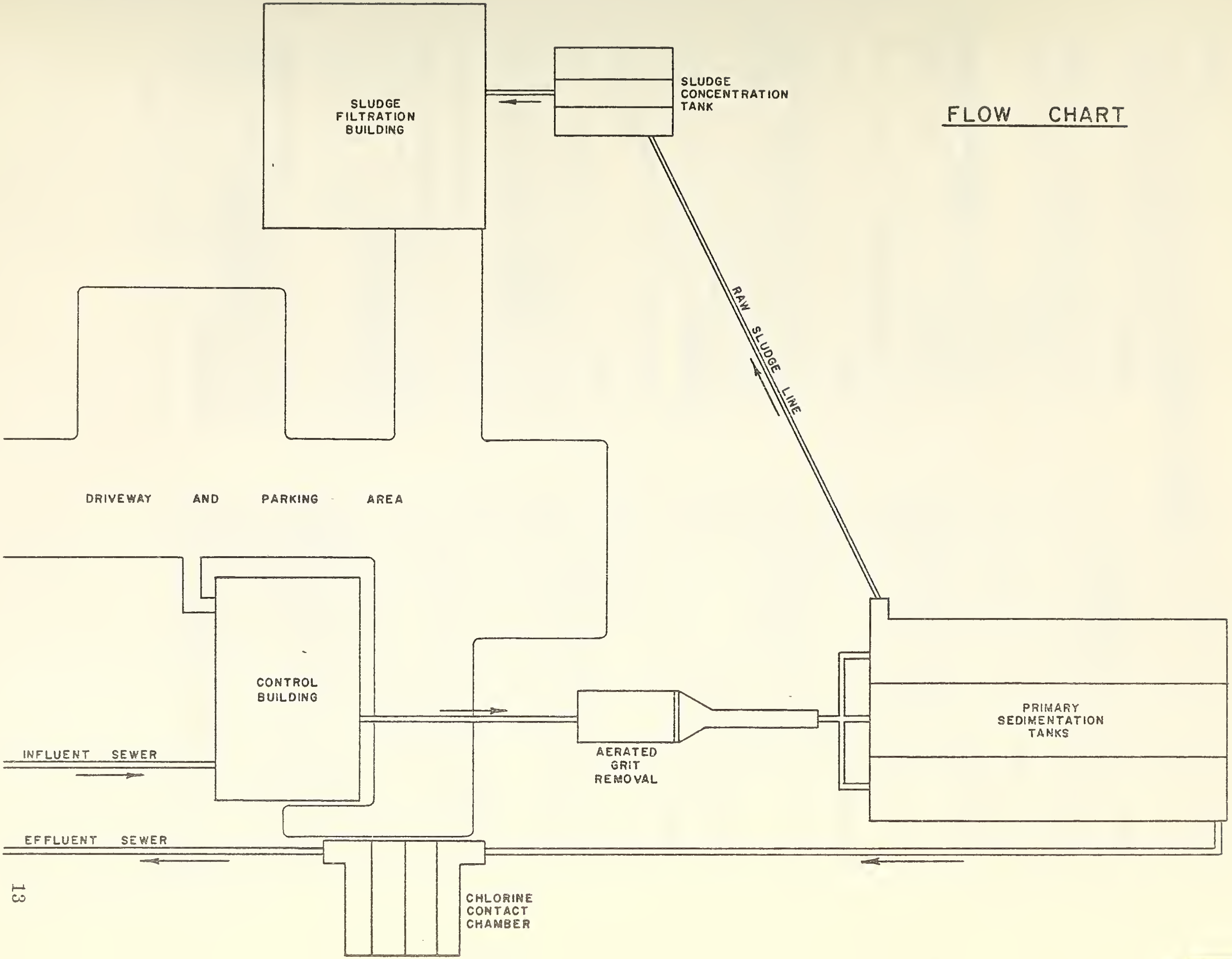


TOTAL ANNUAL COST



Technical Section

FLOW CHART


SLUDGE FILTRATION BUILDING
SLUDGE CONCENTRATION TANK
RAW SLUDGE LINE
DRIVEWAY AND PARKING AREA
CONTROL BUILDING
INFLUENT SEWER
AERATED GRIT REMOVAL
PRIMARY SEDIMENTATION TANKS
EFFLUENT SEWER
CHLORINE CONTACT CHAMBER

Design-Data

Design Population - 5300 persons (equivalent)

Per Capita Flow - 545 GPD

Design Plant Flow - 2. 1 MGD

Five Day BOD-

Raw Sewage - 210 PPM

Removal - 30%

Suspended Solids-

Raw Sewage - 296 PPM

Removal - 60%

PUMPING STATIONS

Pumping Station #1

Inlet -

12 inch gravity sewer from north

6 inch forcemain from pumping station #4

Screening -

Bar Screen with 1 inch openings and Model "C" Barminutor

Pumps -

No. 1 and No. 3 - Worthington 1750 gpm at 66' T. D. H. Model 6-FLC-15 driven by Westinghouse 40 hp wound rotor motor type H. W. A.

No. 2 - Worthington 1750 gpm at 66' T. D. H. Model 6-FLC-15 driven by Westinghouse 40 hp squirrel cage motor type H. S. A.

Overflow -

24 inch dia. sewer from overflow manhole #23 to Lynn River.

Forcemain -

16 inch dia. A-C from pumping station to the intersection of Pansy Avenue and Erie Street.

Pumping Station #2

Inlet -

8 inch diameter sewer serving Culverhouse Co. 8 inch dia. sewer serving Patterson Street and a 12 inch dia. sewer serving Norfish Co.

Screening -

Basket screen on each influent sewer.

Pumps

Two Fairbanks-Morse 6 inch pumps each having a capacity of 417 gpm at 48' T. D. H. and driven by a Tamper 10 hp motor.

Overflow

12 inch dia. A-C discharging to the Lynn River.

Pumping Station #3

Inlet -

10 inch diameter A-C sewer on Grand Street and 24 inch dia. combined sewer serving Branthill Area.

Screening -

Basket screen on each influent sewer.

Pumps -

Two Fairbanks-Morse pumps each having a capacity of 207 gpm at 65' T. D.H. and driven by a 10 hp Tamper motor.

Overflow -

24 inch dia. sewer from manhole 21 to Lynn River.

Pumping Station #4

Inlet -

12 inch dia. A-C sewer on Harbour St.

Screening -

Basket screens

Pumps -

Two 4 inch Flygt submersible pumps. Model CP-100 each capable of pumping 217 IGPM at 19' T. D. H.

Forcemain -

6 inch diameter A-C

WATER POLLUTION CONTROL PLANT

Flow Measurement -

Parshall flume located in channel directly downstream of aerated grit chamber and having a throat width of 9 inches and a maximum capacity of 4. 2 mgd under a head of 22 inches.

Sewage Pumps -

No. 1 - Worthington Model 5-FLC-10, 1150 rpm, maximum capacity 800 gpm at 23. 9' T. D. H. Motor Westinghouse Type H. S. A. - 7 1/2 hp.

No. 2 - Worthington Model 5-FLC-10, 1150 rpm, maximum capacity 800 gpm at 23. 9 T. D. H. Motor Westinghouse Type H. S. A. 7 1/2 hp.

No. 3 & 4 - Worthington Model 6-FLC-15, 860 rpm, maximum capacity 1750 gpm at 24. 9' T. D. H. Motor-Westinghouse Type H. S. A. - 20 hp.

Grit Removal -

Aerated grit tank equipped with Sparjers.
Dimension - 20' x 10' x 11. 85'
Volume - 2. 370 cu. ft. or 14, 750 gallons.
Detention at 2. 088 mgd = 10 minutes.
Detention at 4. 16 mgd = 5 minutes.

Air Supply -

One Roots Connersville Type AF rotary positive air blower.
Capacity - 130 cfm at 5. 25 psi

Motor

Bull 5 hp. 1740 rpm.

Grit Collector -

Min. capacity of 22 cu. ft. grit per hour as manufactured by Rex Chainbelt Inc.

Primary Settling Tanks

Three rectangular tanks equipped with Rex Chainbelt Inc. clarifier mechanisms

Dimensions: 75' x 15' x 8' each
Volume: 9000 cu. ft. each or 27, 000 cu. ft. and 168, 000 gallons for 3
Detention at 2. 088 mgd - 1. 93 hours
Detention at 4. 16 mgd - 0. 97 hours
Surface settling rate at 2. 088 mgd - 620 gallons/sq. ft. of tank/day.
Surface Settling rate at 4. 16 mgd - 1240 gals/sq. ft. of tank/day.
Weir overflow rate at 2. 088 mgd - 46, 500 gals/lin. ft. of weir/day.

Sludge Removal -

Three revolving rack and pinion scum skimmers. Scum is transferred to concentration tank with raw sludge.

Chlorine Contact Chamber -

Dimensions - 21'6" x 18' x 6'6"
Volume - 2,550 cu. ft. or 15,950 gallons
Contact period - 11.0 minutes at 2.088 mgd.
- 5.5 minutes at 4.16 mgd.

Chlorinator - Plant

Fischer and Porter series 3400 automatically controlled by pump sequence controller.
Maximum capacity 400 lbs. per day.

Process Water Pump

Darling horizontal centrifugal pump - 1 1/2 DAYC-W having a capacity of 100 US GPM at 150 ft.
Driven by 7 1/2 hp Tamper motor.

Sludge Concentration Tank

Volume: 2,460 cu. ft. or 5,300 gallons

Sludge Pump

Marlow Model 404E driven by a 2 hp US motor through a variable speed drive. Capacity from 20 to 60 US GPM at 30 ft. total head.

Vacuum Filter

One Eimco Corporation Filter - drum diameter 8 ft. - drum area 200 sq. ft.

Vacuum Pump

Nash Model H-6 - 308 cu. ft. at 20" Hg. of vacuum.

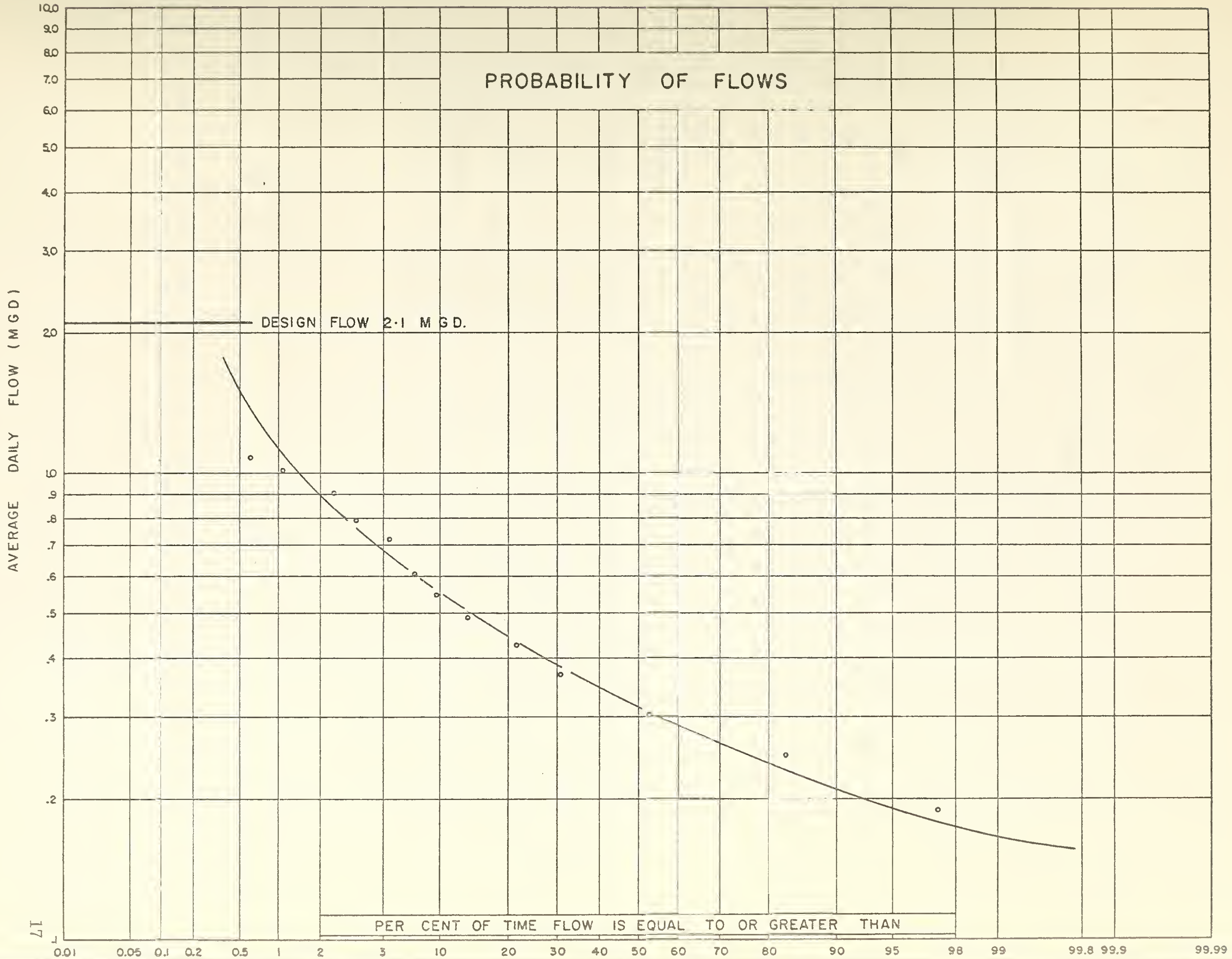
Process Data

GENERAL

The following data provide information regarding the flows treated by the Port Dover Water Pollution Control Plant, the degree of treatment achieved and the chlorine required for disinfection.

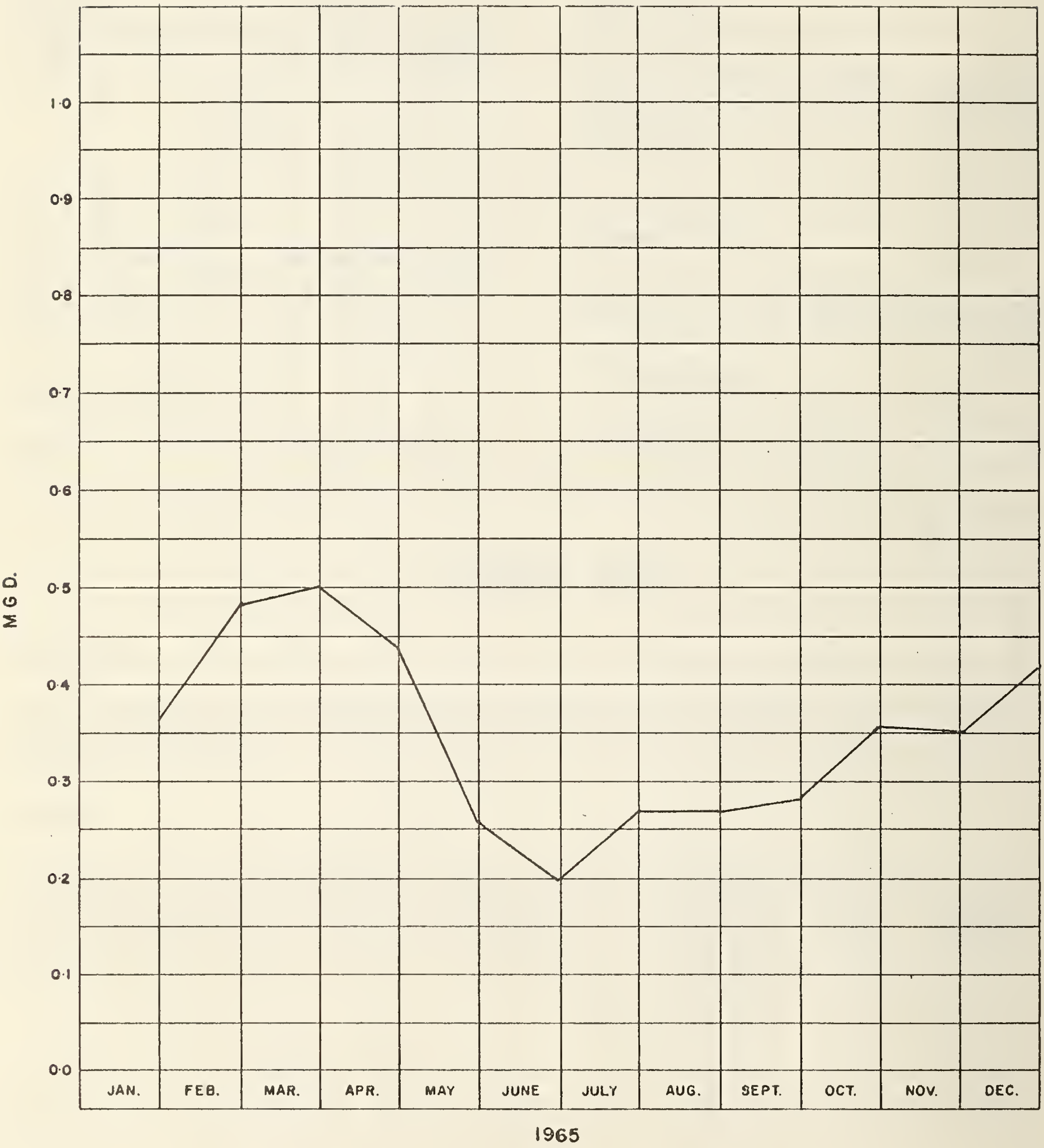
FLOW

A total of 126.92 million gallons of raw sewage was given primary treatment in 1965. The average daily flow for the year was .35 mgd. The peak month was March with a total flow of 15.48 mg for an average daily flow for the month of .50 mgd. The maximum recorded flow for one day was 1.064 million gallons and occurred on November 23, 1965.



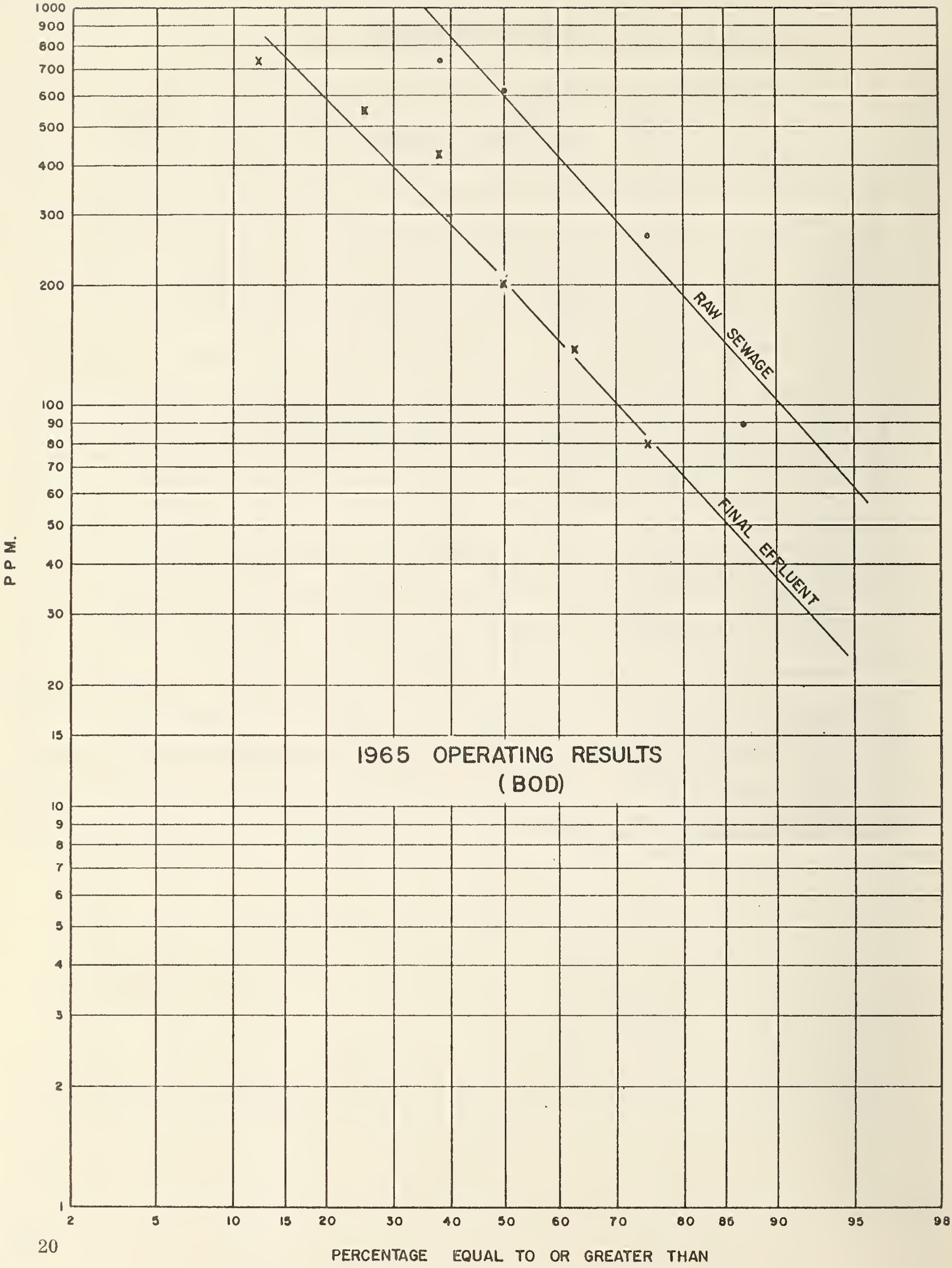
PROBABILITY OF FLOWS

AVERAGE DAILY FLOW



FLOW SUMMARY

MONTH	TOTAL FLOW	MAX. 24 HOUR FLOW	MAX. INSTANT FLOW	MIN. 24 HOUR FLOW
JANUARY	11.09	-	-	-
FEBRUARY	13.46	-	-	-
MARCH	15.48	-	-	-
APRIL	13.28	-	-	-
MAY	8.03	-	-	-
JUNE	6.03	-	-	-
JULY	8.41	-	-	-
AUGUST	8.23	-	-	-
SEPTEMBER	8.484	.581	4.50	.148
OCTOBER	10.954	1.032	4.50	.149
NOVEMBER	10.519	1.064	3.00	.175
DECEMBER	12.959	.926	2.50	.250
TOTAL	126.926	3.603	1.45	.722
AVERAGE	10.577	.901	.363	.181

1000
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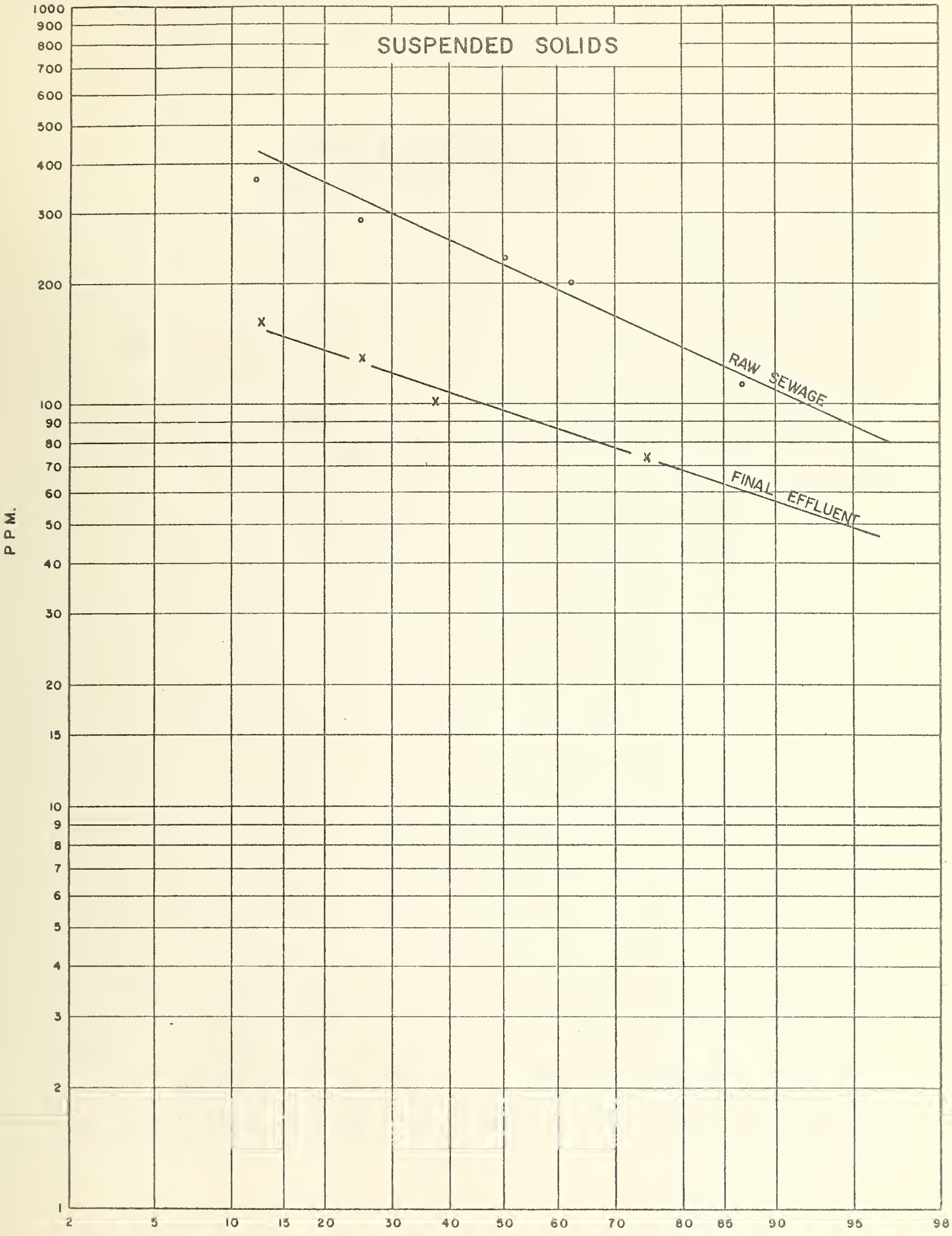
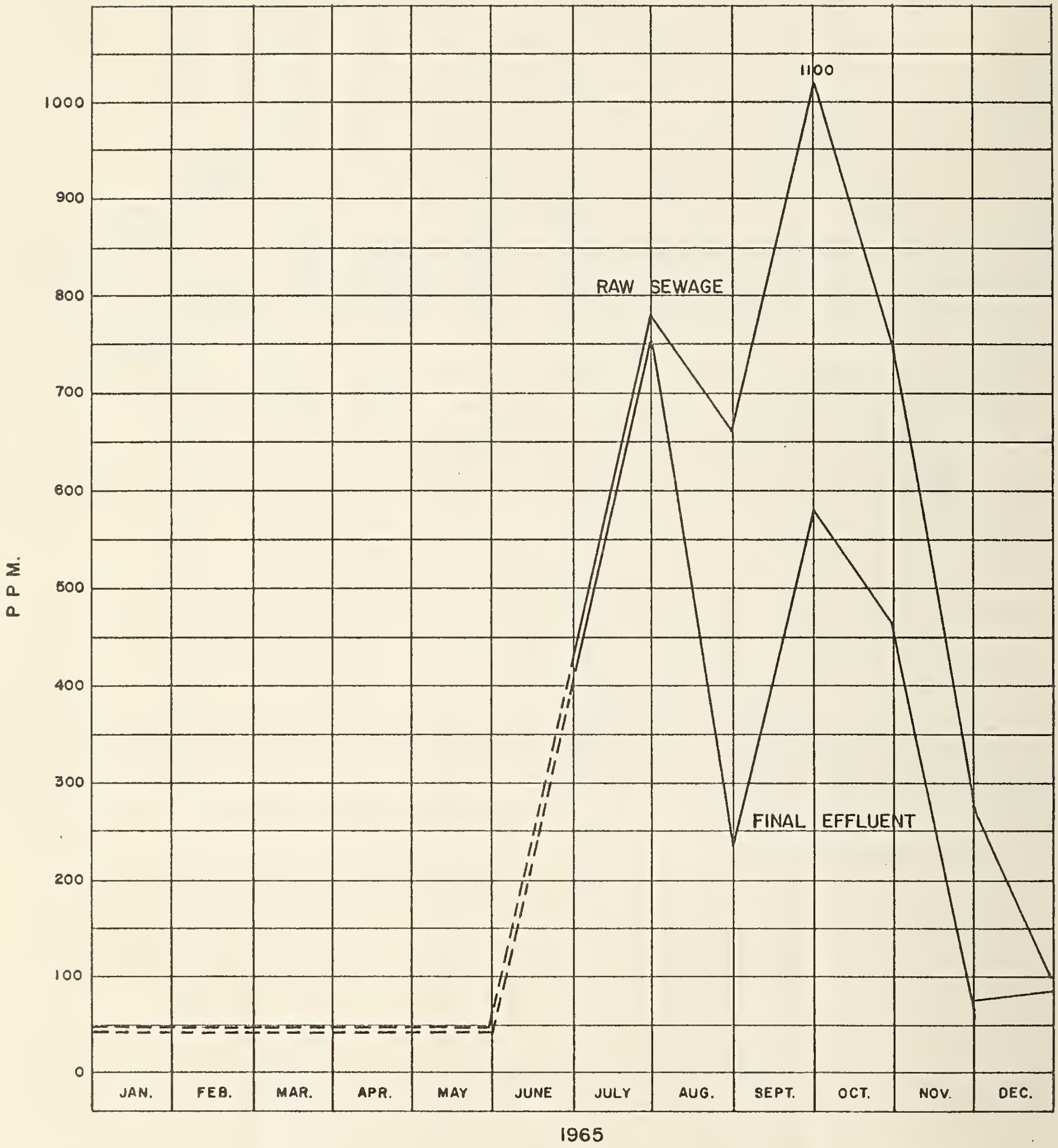
RAW SEWAGE
FINAL EFFLUENT
1965 OPERATING RESULTS
(BOD)
PERCENTAGE EQUAL TO OR GREATER THAN

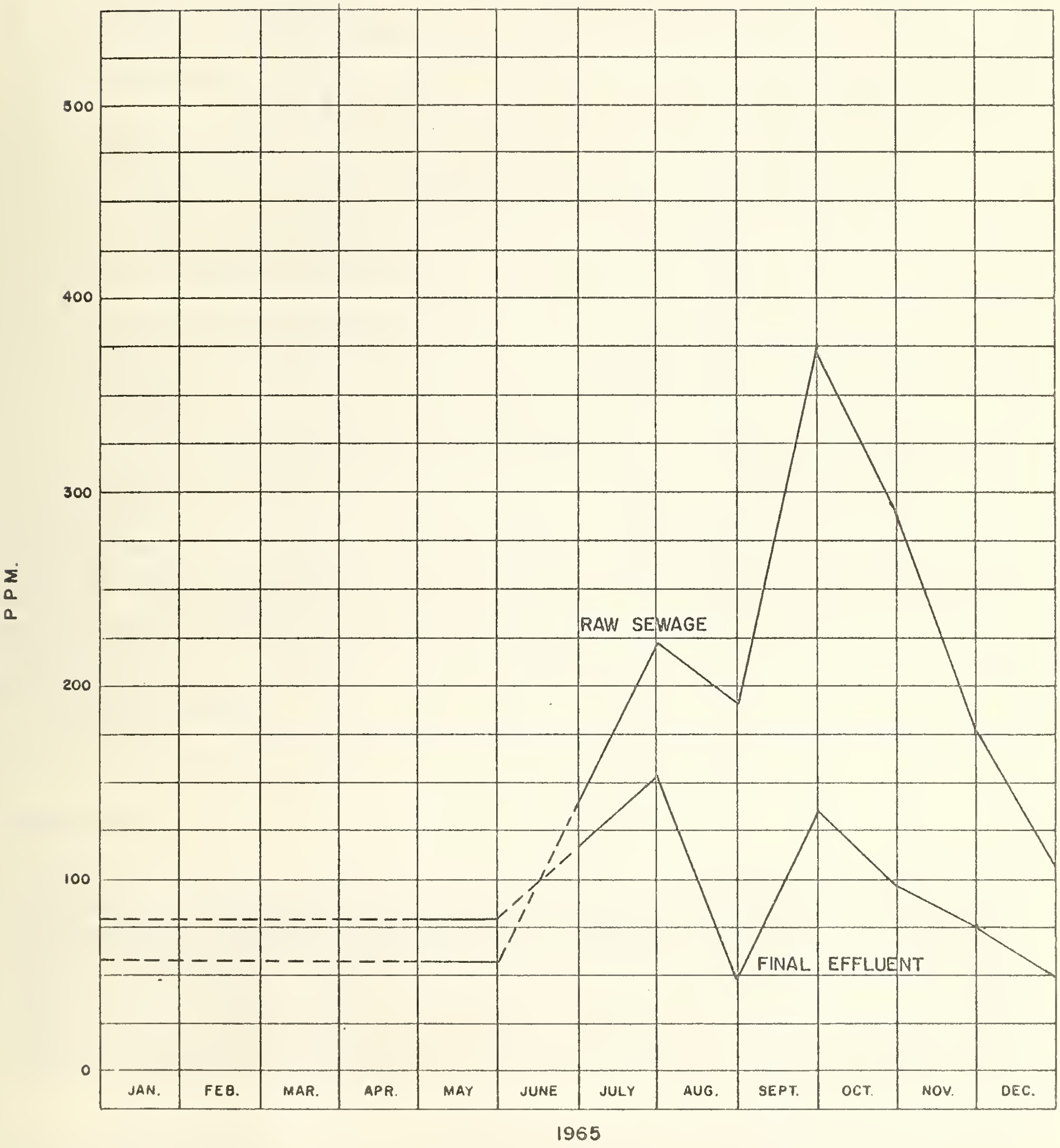


PERCENTAGE EQUAL TO OR GREATER THAN

MONTHLY VARIATIONS
BIOCHEMICAL OXYGEN DEMAND



MONTHLY VARIATIONS
SUSPENDED SOLIDS



GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	
JAN.	527	319	39.5	11.5	205	88	57.0	6.5	23
FEB.	527	319	39.5	14.0	205	88	57.0	7.9	20
MAR.	527	319	39.5	16.1	205	88	57.0	9.0	25
APR.	527	319	39.5	13.8	205	88	57.0	7.8	23
MAY	46	43	6.5	0.1	81	59	27.0	0.9	12
JUNE	527	319	39.5	6.3	205	88	57.0	3.5	40
JULY	780	760	2.5	0.8	224	153	31.5	3.0	41
AUG.	660	230	65.0	17.7	192	48	75.0	5.9	34
SEPT.	1100	580	47.0	22.0	374	136	63.5	10.1	13
OCT.	740	460	38.0	15.3	290	96	67.0	10.6	28
NOV.	272	74	73.0	10.4	175	76	56.5	5.2	26
DEC.	92	84	8.5	0.5	102	48	53.0	3.5	18
TOTAL	-	-	-	132.0	-	-	-	74.2	303
AVG.	527	319	39.5	11.0	205	88	57.0	6.2	25

COMMENTS

The average biochemical oxygen demand (BOD) of the raw sewage was 526 ppm and the average suspended solids content was 205 ppm. The BOD value is 150% over the design value of 210 ppm, while the suspended solids value is 31% under the design value of 206 ppm. The average reductions of 39.5% for BOD and 57.0% for SS are normal for a primary treatment plant. However, the fact that the hydraulic loading was considerably under the design capacity of the plant for 1965 must be considered when evaluating the above data.

The grit removed was approximately 2.4 cubic feet per million gallons which is within the accepted range for normal sanitary sewage.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (P.P.M.)
JANUARY	11.09	-	-
FEBRUARY	13.46	-	-
MARCH	15.48	-	-
APRIL	13.28	-	-
MAY	8.03	-	-
JUNE	6.03	-	-
JULY	8.41	-	-
AUGUST	8.23	* 1712	22.64
SEPTEMBER	8.48	1875	22.11
OCTOBER	10.95	1487	13.58
NOVEMBER	10.52	-	-
DECEMBER	12.96	-	-
TOTAL	126.92	5074	-
AVERAGE	10.58	1691	18.89

* 28 days chlorination

COMMENTS

Disinfection of the final effluent is accomplished by the addition of chlorine. Disinfection is practiced between May 15 and November 1. A combined chlorine residual of 0.5 ppm after 15 minutes contact time is maintained.

RECOMMENDATIONS

1. With a primary treatment plant, the effluent quality is directly related to the strength of the raw sewage. By insisting that municipalities adhere to the municipal sewer use bylaw the strength of the raw sewage can be kept within tolerable limits. Municipal officials have during the past year been most co-operative in this regard. They have in their wisdom requested an industrial wastes survey to be carried out by the OWRC.

When the results of this survey are received, the recommendations contained in the report for controlling industrial waste discharges to the sewers should be acted upon as rapidly as possible.

Early action will not only result in an improved effluent quality but in many cases will mean reduced operating costs.

2. On the basis of present sewage strengths, early consideration should be given to the extension of plant facilities to include secondary treatment.

ONTARIO WATER RESOURCES COMMISSION